Tanta University

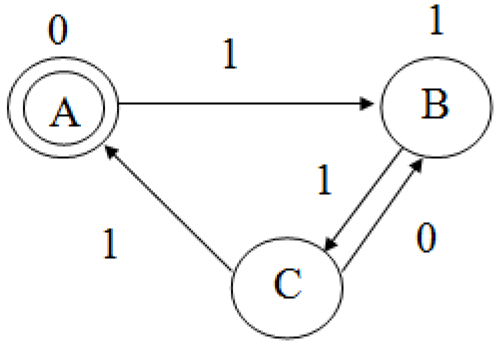
Department: **Computers and Control Engineering**

Faculty of Engineering

Course Title: Compilers and Languages **Sheet #3 2015/2016**

1. Construct NDF automata for the following regular expressions. Show the sequence of moves made by each in processing the input string ***ababbab.***
   a) (a|b)*
   b) (a*|b*)*
   c) ((∊| a)b*)*
   d) (a|b)*abb(a|b)*

2. Construct regular expression corresponding to the following finite automata.



3. Convert the NFA's in problem 3 into DFA's. Show the sequence of moves made by each in processing the input string ***ababbab.***

4. Give an NFA with 4 states which accepts the language (01, 011, 0111). Use the subset construction to obtain an equivalent DFA.

5. We can prove that two regular expressions are equivalent by showing that their minimum-state DFA's are the same, except for the state names. Using this technique, show that the following regular expressions are all equivalent.
   a) (a|b)*
   b) (a*|b*)*
   c) ((∊| a)b*)*

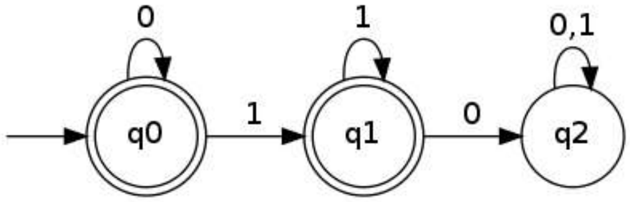
6. Consider the regular expression below which can be used as part of a specification of the definition of exponents in floating-point numbers. Assume that the alphabet consists of numeric digits (‘0’ through ‘9’) and alphanumeric characters (‘a’ through ‘z’ and ‘A’ through ‘Z’) with the addition of a selected small set of punctuation and special characters (say in this example only the characters ‘+’ and ‘-‘ are relevant). Also, in this representation of regular expressions the character ‘.’ denotes concatenation.

Exponent = (+ | - | ε) . (E | e) . (digit)+

For this regular expression answer the following questions:

a) Derive an NFA capable of recognizing this language.
b) Derive the DFA for the NFA that you derive in a.

7. Consider the following deterministic finite automata over the alphabet $\Sigma=\{0,1\}$.



i. Give a one-sentence description of the language recognized by the DFA.
ii. Write a regular expression for this language.

Best wishes

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